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REMARKS

Claims 1-20 are pending in the present application. Claims 21-26 have been added, leaving Claims 1-26 for consideration upon entry of the present Amendment.

Antecedent basis for new Claims 21-22, and 24 can at least be found at page 7, line 22 to page 8, line 8 of the specification.

Antecedent basis for new Claims 23 can at least be found at page 13, lines 11-16.

Antecedent basis for new Claim 25-26 can at least be found at page 10, line 29 to page 11, line 2 of the specification.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1-3, 6, 10, and 11 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 4,900,425 to Sasayama et al. Claims 1-3, and 6 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 4,655,901 to Mase et al. Applicants respectfully traverse these rejections.

Applicants' independent Claim 1 is directed to a gas sensor, comprising: a first electrode and a reference electrode with an electrolyte disposed therebetween, wherein the first electrode and the reference electrode are in ionic communication, wherein the reference electrode has a surface on a side of the reference electrode opposite the electrolyte and the surface has a surface area; and a reference gas channel in fluid communication with the reference electrode, wherein at least a portion of the surface of the reference electrode physically contacts at least a portion of the reference gas channel, and wherein the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area.

Sasayama et al. teach an oxygen sensor in which an airtight reference chamber, isolated from a surrounding space, is formed on one main surface of a solid electrolyte. (Abstract). Sasayama et al. and Mase et al. do not discuss or even mention electrode size in relation to a reference gas channel.

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Mase et al. teach a measuring electrode mounted on one side surface of a solid electrolyte, while a reference electrode is mounted on a separate solid electrolyte and disposed so as to face the opposite side surface of said one solid electrolyte across a gap. (Abstract).

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Variant Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

In making the anticipation rejection, the Examiner relied upon the drawings of Sasayama et al. (Figure 8) and Mase et al. (Figure 4). However, these references are silent as to scale, proportion, or measurements in the Figures. Accordingly, a determination of whether "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area" cannot be made using Figure 8 of Sasayama et al. and Figure 4 of Mase et al. without some reference as to scale or proportion. (See MPEP §2125 "When the reference does not disclose that the drawings are to scale, and is silent as to dimensions, arguments based on measurement of the drawing features are of little value, citing *In re Wright*, 569 F.2d 1124, 193 USPQ 332(CCPA 1977):

"We disagree with the Solicitor's conclusion, reached by comparison of the relative dimensions of appellants and *Bauer*'s drawing figures, that *Bauer* 'clearly points to the use of a chime length of roughly 1/2 to 1 inch for a whiskey barrel.' This ignores the fact that *Bauer* does not disclose that his drawings are to scale."

Additionally, with regard to Figure 8 of Sasayama et al., even if the Figure 8 were to scale, which there is not indication that it is, Figure 8 is a cross sectional view. Since figure 8 is a cross sectional view, it is impossible to determine exactly what percentage of the reference electrode is in physical contact with the reference gas channel, because neither the electrode area nor the reference gas channel are visible. As such, the anticipation rejection is improper.

With respect to Mase, et al., the Examiner's references to "reference electrode 4 with a portion of a surface exposed to a reference gas channel 7, 7'." (Paper 5, page 2). It is notes that 7' refers to a "porous ceramic or solid electrolyte", not a gap. (Col. 4, lines 57-58).

For at least these reasons, the above-cited references fail to teach at least "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area." Since Sasayama et al. and Mase et al. at least fail to teach "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area," they do not teach each and every element of Applicants' independent Claim

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1. As such, independent Claim 1 is not anticipated. Moreover, as dependent claims from an allowable independent claim, Claims 2-3, 6, 10, and 11 are, by definition, also allowable.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 4-5 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,900,425 to Sasayama et al. or U.S. Patent No. 4,655,901 to Mase et al. Claims 7-9 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,900,425 to Sasayama et al. or U.S. Patent No. 4,655,901 to Mase et al. in view of U.S. Patent No. 5,976,350 to Yamada et al. or U.S. Patent No. 6,287,439 to Kato et al. Claims 12-16 and 20 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,900,425 to Sasayama et al. or U.S. Patent No. 4,655,901 to Mase et al. in view of U.S. Patent No. 5,529,677 to Schneider et al. or U.S. Patent No. 5,169,512 to Wiedenmann et al. Claims 17-19 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 4,900,425 to Sasayama et al. or U.S. Patent No. 4,655,901 to Mase et al. in view of U.S. Patent No. 5,529,677 to Schneider et al. or U.S. Patent No. 5,169,512 to Wiedenmann et al. and U.S. Patent No. 5,976,350 to Yamada et al. or U.S. Patent No. 6,287,439 to Kato et al. Applicants respectfully traverse these rejections.

Applicants' independent Claim 12 is directed to a method for forming a gas sensor, comprising: disposing an outer electrode and a reference electrode on opposite sides of an electrolyte such that the outer electrode and the reference electrode are in ionic communication, wherein the reference electrode has a surface on a side of the reference electrode opposite the electrolyte; disposing at least a portion of a fugitive material in physical contact with a portion of the reference electrode surface, wherein the reference electrode has a surface area and the portion of the reference electrode surface in physical contact with the fugitive material is less than about 90% of the surface area; disposing a heater on a side of the fugitive material opposite the reference electrode to form a green sensor; and co-firing the green sensor.

Yamada et al. is directed to a method of detecting an activated condition of a wide range air-fuel ratio sensor. (Abstract). Yamada teaches a sensor having an impedance from within a range of 1000 to 5000 ohms. (Col. 8, lines 55-57).

Kato et al. teach a gas sensor to decrease the offset value to a degree in which no trouble occurs in the measurement without causing any reduction of NO_x so that the measurement

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accuracy is improved. (Abstract). Kato et al. teach a sensor having an impedance of not less than 1000 ohms (Col. 4, lines 51-56 and Col. 12, lines 52-57).

Schneider et al. teach a planar polarographic sensor for determining the lambda value of gas mixtures, for use with exhaust gases in internal combustion engines. (Abstract). A reference electrode is arranged at a lower side of a thin solid electrolyte sheet and is in contact with a reference gap. (Col. 3, lines 55-57).

Wiedenmann et al. teach a planar polarographic probe for determining the lambda value of gas mixtures, in particular of exhaust gases of internal combustion engines. (Abstract).

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

In addition to not teaching "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area", as discussed in response to the anticipation rejection, Sasayama et al. and Mase et al. fail to provide the necessary suggestion or incentive that would have lead one skilled in the art to make Applicants' claimed invention. The text of both Sasayama et al. and Mase et al. are silent to any teachings or suggestion that "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area." As discussed above, the figures of Sasayama et al. and Mase et al. are insufficient to provide any teaching with respect to element sizes, and are only sufficient to establish element locations with respect to other elements.

Furthermore, with regard to Claims 4-5, the Examiner stated, "the size of the reference electrode's portion being exposed to the reference gas channel is a matter of routine design choice in the absence of unexpected result." (Office Action, page 3). In the present case, Applicants teach, *inter alia*, "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area." Throughout Applicants'

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specification, Applicants identify a number of advantages that may be imparted to a sensor having "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area." For example, Applicants teach

[p]reviously it was believed that the portion of the reference electrode which did not overlap the reference gas channel would be inactive. Consequently, the reference electrode, to minimize resistance, had a diameter substantially equivalent to the width of the reference gas channel. It has been discovered, however, that a reduction in impedance can be obtained by increasing the size of the reference electrode with the ultimate size merely bounded by the size of the layer upon which the electrode is disposed. (Page 7, lines 24-30).

Applicants submit that Applicants invention as defined by Applicants claims provide unexpected results over the prior art. As such, Applicants' independent Claim 1 is not obvious over Sasayama et al. and Mase et al. Moreover, as a dependent claim from an allowable independent Claim, Claims 4, 5, are, by definition, also allowable.

Furthermore, Yamada et al. and Kato et al., fail to cure the deficiencies of Sasayama et al. and Mase et al., i.e., taken alone or in combination with Sasayama et al. and Mase et al., they fail to teach or suggest, *inter alia*, "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area." The Examiner relied upon Yamada et al. and Kato et al. for their teachings of a sensor having an impedance below 4000 ohms. (Office Action, page 3). Although Yamada et al. and Kato et al. may teach an impedance below 4000 ohms, they do not contain any teachings or suggestions that "the portion of the reference electrode in physical contact with the reference gas channel is less than about 90% of the surface area." The Examiner relied upon Sasayama et al. and Mase et al. for that teaching. As discussed above, Sasayama et al. and Mase et al. fail to teach or suggest the size of the reference electrode in relation to the size of the reference gas channel. As such, Applicants independent Claim 1 is not obvious over Sasayama et al. and Mase et al. in view of Yamada et al. and Kato et al. Moreover, as a dependent claim from an allowable independent claim, Claims 7-9 are, by definition, also allowable.

Additionally, with regard to Applicants' independent Claim 12 and claims depending therefrom, none of the above-cited art, either alone or in combination, teach or suggest, *inter alia*, "disposing at least a portion of a fugitive material in physical contact with a portion of the reference electrode surface, wherein the reference electrode has a surface area and the portion of

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the reference electrode surface in physical contact with the fugitive material is less than about 90% of the surface area." More particularly, while Schneider et al. and Wiedenmann et al. teach using a fugitive material, they fail to cure the deficiencies of Sasayama et al. and Mase et al. Applicants direct the Examiners attention to the afore made arguments regarding Sasayama et al. and Mase et al. Since none of the above-cited art, either alone or in combination teach or suggest, "disposing at least a portion of a fugitive material in physical contact with a portion of the reference electrode surface, wherein the reference electrode has a surface area and the portion of the reference electrode surface in physical contact with the fugitive material is less than about 90% of the surface area," Applicants' independent Claim 12 is not obvious. Moreover, as dependent Claims from an allowable independent claim, Claims 16-20, are by definition also allowable. Accordingly, Applicants' request withdrawal of the rejection and allowance of the claims.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

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CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002
Telephone (860) 286-2929
Facsimile (860) 286-0115

By Joel T. Charlton
Joel T. Charlton
Registration No. 52,721

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